We claim:

1. A microfluidic device comprising:

a main flow path comprising a detection zone and an outlet; and

at least two inlet flow paths wherein the inlet flow paths intersect and merge into the main flow path at or upstream of the detection zone at an upstream angle of less than 90°.

2. The microfluidic device of Claim 1 further comprising two inlet flow paths.

3. The microfluidic device of Claim 1 further comprising three inlet flow paths.

4. The microfluidic device of Claim 3 wherein the main flow path has at least one detection zone at or downstream of each intersection of each inlet flow path with the main flow path.

5. The microfluidic device of Claim 1 wherein the main flow path is from about 0.1 μm deep by 0.1 μm wide to about 1 mm deep by 2 mm wide.

6. The microfluidic device of Claim 1 wherein the first inlet flow path is from about 0.1 μm deep by 0.1 μm wide to about 1 mm deep by 2 mm wide.

7. The microfluidic device of Claim 1 further comprising means for applying a flow inducing force.

8. The microfluidic device of Claim 6 wherein the flow inducing force is electricity.

9. The microfluidic device of Claim 6 wherein the flow inducing force is negative or positive fluid pressure.

10. The microfluidic device of Claim 9 wherein positive or negative pressure is applied to the outlet.

11. The microfluidic device of Claim 1 wherein the device further comprises cells in at least one of the inlet flow paths and the main flow path.

12. The microfluidic device of Claim 1 wherein the device further comprises leukocytes, a calcium dye and a candidate compound in the main flow path.

13. An observation device comprising a plurality of microfluidic devices of Claim 1 sharing a common detection zone.

14. The observation device of Claim 13, wherein the main flow paths of the microfluidic devices are substantially parallel at the common detection zone.

15. An observation device comprising a plurality of microfluidic devices of Claim 1 wherein the main flow paths of the microfluidic devices are substantially parallel at their detection zones.

16. A method of observing the effect of a candidate compound on cells in a microfluidic device comprising:

(a) providing a microfluidic device comprising a main flow path comprising a detection zone, and an outlet and at least two inlet flow paths intersecting and merging with the main flow path at or upstream of the detection zone;

(b) applying at least one cell to a first inlet flow path and the candidate compound to a second inlet flow path;

(c) inducing flow of the cells and the candidate compound toward the outlet;

(d) allowing the cells to mix with the candidate compound at the intersection of the second inlet flow path and the main flow path; and

(f) observing the effect of the candidate compound on the cells in the detection zone.

17. The method of Claim 16 wherein the microfluidic device has three inlet flow paths and a second candidate compound is added to the third inlet flow path.

18. The method of Claim 16 further comprising stopping the flow of the cells while the cells are in the detection zone.

19. The method of Claim 17 further comprising observing the cells in each of a number of detection zones wherein the main flow path comprises a plurality of detection zones, wherein each detection zone is at or downstream of each intersection of each inlet flow path with the main flow path.

20. The method of Claim 16 wherein the candidate compound being studied is a cell activator and the cell is a lymphocyte.

21. The method of Claim 17 wherein cells are added to a first inlet flow path, cell activator is added to a second inlet flow path, and a candidate compound is added to a third inlet flow path.

22. The method of Claim 21 wherein the candidate compound being studied is an inhibitor, and the cells are lymphocytes.

23. The method of Claim 16 wherein the flow paths are coated with a substance selected from the group consisting of proteins, glycoproteins, phospholipids, hydrophilic polymers and hydrophobic polymers.

24. The method of Claim 23 wherein the flow path is coated with protein.

25. The method of Claim 23 wherein the flow is induced by an electric force.

26. The method of Claim 24 wherein the flow is induced by positive or negative fluid pressure.

27. A method for studying calcium influx in a lymphocyte comprising:

(a) providing a microfluidic device comprising a main flow path having a detection zone, at least two inlet flow paths sequentially intersecting with the main flow path upstream of the detection zone and an outlet downstream from the detection zone;

(b) applying lymphocytes to a first inlet flow path and an activator to a second inlet flow path;

(c) inducing flow of the lymphocytes and the activator toward the outlet;

(d) allowing the lymphocytes to mix with the activator at the intersection of the second inlet flow path and the main flow path; and

(e) observing the effect of the activator on the lymphocytes in the detection zone.

28. The method of Claim 27 wherein the microfluidic device comprises three inlet flow paths further comprising adding a candidate compound to a third inlet flow path; and observing the effect of the candidate compound on the lymphocytes in the detection zone.

29. A method for studying leukocyte rolling comprising:

(a) providing a microfluidic device comprising a main flow path comprising a detection zone and an outlet and at least two inlet flow paths sequentially intersecting and merging with the main flow path at or upstream of the detection zone and wherein the walls of the main flow path in the detection zone have attached thereto cell adhesion molecules;

(b) applying at least one leukocyte to a first inlet flow path;

(c) applying a candidate compound to a second inlet flow path;

(d) inducing flow of the cells and the compound into the main flow path;

(d) allowing the leukocytes, candidate compound and cell adhesion molecules to interact; and

(e) observing the leukocyte rolling in the detection zone.

30. The method of Claim 29 wherein the device comprises three inlet flow paths, further comprising adding an inhibitor to said third inlet flow path; mixing the inhibitor, leukocytes, candidate compound and cell adhesion molecules and observing the leukocyte rolling in the detection zone.

31. The method of Claim 30 further comprising stopping the flow of the cells, candidate compound and inhibitor during the mixing step.

32. The device of Claim 1 further comprising variations in the cross-section of the main flow path.

33. The device of Claim 32 wherein the variations create a cell trapping zone.

34. The device of Claim 33 wherein said variations are weirs.

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